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May 29, 1996

Dear PM-1, ACRIM, SAGE III, and Data Assimilation Team Members:

Based on precedents established over the last few years by the Science Working Group for the AM Platform (SWAMP), it is generally acknowledged that the starting point for a well-developed and widely accepted EOS data product is the development of an algorithm theoretical basis document (ATBD). As was required of the EOS AM-1, LIS, and SeaWinds science teams in January 1994, it is now time for the PM-1, ACRIM, SAGE III, and Data Assimilation science teams to submit for review ATBDs covering their data products. The purpose of this letter is to outline the guidelines and procedures for developing an ATBD and implementing this review.

It is required that the theoretical basis of the algorithm for each data product of your AIRS/AMSU/HSB investigation be described in a 30-40 page document. This document should describe in some detail the granules and metadata to be included, all internal and external data product flows to be utilized, a physical and mathematical description of the algorithm, variance or uncertainty estimates, and practical considerations, such as calibration and validation, exception handling, quality control, and diagnostics. In addition, I encourage you to identify parallel aspects of your algorithm, including how your algorithm could be grouped to minimize data I/O. Although closely related algorithms may be combined into one document, an ATBD must be prepared for each product some 3-5 years before launch. Examples of existing ATBDs, already reviewed and revised, can be found on the Project Science Office Web page (http://spso.gsfc.nasa.gov/spso_homepage.html).

Following the preparation and submission of an ATBD, the Project Science Office will initiate a written as well as a panel review of each document. The former will be anonymous, though the reviewers will be encouraged to identify themselves where they feel their comments could initiate more constructive dialog with the algorithm developers. This review process will commence for the EOS PM-1, ACRIM, SAGE III, and Data Assimilation teams in late November, with ATBDs due to the EOS Project Science Office November 15. I ask that when you submit your ATBD, you also provide a short list of peers and colleagues whom you feel would be especially well suited to review your ATBD. Though I assume no obligation to use this list of referees, and will need to balance the ATBDs amongst a large number of reviewers so as not to overtax any particular referee, I will give serious consideration to your recommendations. Furthermore, do not hesitate to suggest experts outside the EOS community and the U.S., as appropriate. When submitting this list of suggested referees to the Project Science Office, please be

sure to include the complete mailing address, telephone and FAX numbers, and, *most importantly*, a valid e-mail address.

It is my intent to follow these written reviews with two weeks of oral presentations to a visiting committee in late February (tentative), to be conducted at or near Goddard Space Flight Center. One week will be devoted to AIRS/AMSU/HSB and AMSR, with the following week devoted to ACRIM, SAGE III, and Data Assimilation. Each oral review panel will be responsible for objectively quantifying the perceived state of each algorithm. After lengthy discussions by the panels during the first round of ATBD reviews for the AM-1, LIS, and SeaWinds science teams, the following were agreed upon as significant areas to be considered when examining each algorithm:

- 1) the role of the products in meeting the objectives of NASA's Mission to Planet Earth (MTPE) Program and the general research agenda;
- 2) soundness (feasibility/practicality) of the algorithm's approach;
- 3) feasibility of generating an operational product using this algorithm;
- 4) determination of the critical areas needing further research and development prior to development as an operational data product;
- 5) soundness of validation strategy;
- 6) appropriateness of the planned schedule for generating the product(s).

NOTE: Although these guidelines were utilized throughout the AM-1, LIS, and SeaWinds reviews, each panel is ultimately responsible for developing its own unique criteria for reviewing the assigned algorithms. It should, therefore, not be assumed that these same guidelines will be used during this round of reviews.

I expect this to be a positive, constructive, and evolutionary process that should both educate and open dialog on substantive issues and concerns, assumptions, validation consequences, etc. The ATBD will serve as a means to help understand and, with test results, critique the algorithm, thereby helping to assure that it is well conceived, computer efficient, and state-of-the-art. It will also serve as a reference to be attached to each data product and will be accessible electronically. Finally, this requirement to prepare an ATBD and to submit it to both written and oral examination by peers is a requirement of all investigators who are responsible for an algorithm for your AIRS/AMSU/HSB investigation, whether a U.S. or foreign investigator.

In summary, I am implementing the following schedule:

- November 15, 1996
 - Hard copy of each ATBD due to the EOS Project Science Office, Code 900, Goddard Space Flight Center, Greenbelt, MD 20771
 - Electronic versions of ATBDs due as well (see attachment for details on requirements for electronic submission)
 - Submit to doug.bennett@gsfc.nasa.gov a list of at least 8 potential referees for each ATBD including postal addresses (with buildings and room numbers where applicable), telephone and FAX numbers, and, most importantly, e-mail addresses
- November 18, 1996 - February 14, 1997
 - Anonymous reviews will be solicited
 - Reviews will be returned to the author, for consideration and incorporation into a second version of the ATBD
 - Reviews will be provided to the visiting committee, along with any revised version of the ATBD that the author wishes to submit
- February 18-20, 1997 (tentative)
 - Oral review of AIRS/AMSU/HSB and AMSR by visiting committee
- February 25-27, 1997 (tentative)
 - Oral review of ACRIM, SAGE III, and Data Assimilation by visiting committee
- March 28, 1997
 - Written report of the recommendations of the visiting committee on AIRS/AMSU/HSB and AMSR will be submitted to the undersigned
- April 4, 1997
 - Written report of the recommendations of the visiting committee on ACRIM, SAGE III, and Data Assimilation will be submitted to the undersigned

The visiting committees (which will be different for each week of the reviews), will consist of experts from the atmospheric sciences, terrestrial physics, oceanography, cryosphere, calibration, and image processing disciplines. Depending on how many ATBDs are prepared, it may be necessary to conduct the oral reviews with some parallel sessions, although I hope to minimize this as much as possible in order to assure the greatest educational value to the presenters and the audience. These reviews will be open, though questioning to the committee may be restricted to maintain an agenda. Finally, we hope to have the presentations from 8:00 a.m. - 3:00 p.m. of each day, with the time slot from 3:00 p.m. - 5:00 p.m. set aside for the committee to meet amongst themselves. I will be an ex officio member of the committee, as the report is to be delivered to me.

It is important to have a semi-formal review prior to software development, so that sug-

gestions from the visiting committee and anonymous referees have the best chance of being incorporated into the algorithms being developed. I hope you agree that this will be a valuable and important process, and a necessary step in assuring that EOS provides first-rate data and analysis of the Earth System.

I look forward to seeing you in February.

Sincerely,

Michael D. King
EOS Senior Project Scientist
Earth Sciences Directorate

Enclosures: Suggested Outline for ATBDs
 Guidelines for Electronic Submission of ATBDs

Enclosure: Suggested Outline for ATBDs

1.0 Introduction

2.0 Overview and Background Information

2.1 Experimental Objective

2.2 Historical Perspective

2.3 Instrument Characteristics

3.0 Algorithm Description

3.1 Theoretical Description

3.1.1 Physics of Problem

3.1.2 Mathematical Description of Algorithm

3.1.3 Variance or Uncertainty Estimates

3.2 Practical Considerations

3.2.1 Numerical Computation Considerations

3.2.2 Programming/Procedural Considerations

3.2.3 Calibration and Validation

3.2.4 Quality Control and Diagnostics

3.2.5 Exception Handling

4.0 Constraints, Limitations, Assumptions

Enclosure: Guidelines for Electronic Submission of ATBDs

ATBD numbers will be assigned by the PSO to each unique document for tracking purposes throughout the review process, i.e., ATBD-AIR-01. In order to assist with the assignment of ATBD numbers, each team leader should submit to Michael King (king@climate.gsfc.nasa.gov) an informal message indicating the titles and total number of ATBDs that are anticipated for an instrument team. This should be done as soon as possible after receipt of this letter.

After an ATBD is complete, put a Microsoft Word or WordPerfect or FrameMaker, etc. version **AND** a PostScript version of the ATBD into an anonymous FTP account on a server at your institution (preferably a machine that is available 24 hours per day/7 days per week). A **single** file (containing text and graphics) is **required** for each of these versions. Do not submit multiple files (some containing text and some containing graphics) for a single ATBD. For example, I created two files: ATBD-MOD-05.msw (Microsoft Word version) and ATBD-MOD-05.ps (PostScript version) for my own MODIS ATBD. Both of these files contain text as well as supporting graphics. Also, when creating a PostScript version of your ATBD from within Microsoft Word or other word processing packages, please remember to select **ALL** fonts for inclusion; otherwise, equations, formulas, and some text may get distorted when viewed or printed from other machines.

Portable Document Format (PDF) versions of each ATBD will be generated by the PSO for posting on the World Wide Web along with the original and PostScript versions. If you are capable of creating a PDF version of your ATBD, then please post it along with the required original and PostScript versions on your FTP site. If you do not have the necessary software for creating PDF files (Acrobat Exchange and/or Distiller), the PSO will generate a PDF version of your ATBD for you using either the original or its PostScript derivative.

When creating your files, please use a logical and consistent naming convention so the ATBDs can be easily identified, i.e., ATBD-AIR-01.msw, ATBD-AIR-01.ps, ATBD-AIR-01.wp, ATBD-AIR-01.fm, ATBD-AIR-01.pdf. Finally, please send an informal message to doug.bennett@gsfc.nasa.gov notifying Doug Bennett when the files are available and specifying their location. He will then ensure that your ATBD is posted on the PSO Web page in the three electronic formats: original (i.e., Microsoft Word), PostScript, and PDF. If you do not have access to a server at your institution, please put your ATBD (all formats) into spso.gsfc.nasa.gov/incoming (128.183.117.20) and notify Doug when you have done so.

You can see how this was done for the AM-1 and LIS ATBDs by clicking *ATBD* under the *Publications* link on the EOS PSO home page. The URL is http://spso.gsfc.nasa.gov/spso_homepage.html.